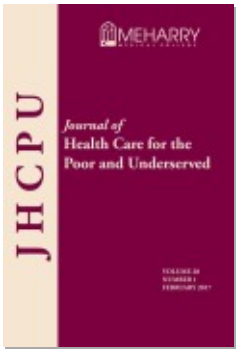
A Two-Year Retrospective Study on the Pattern of Dental Trauma and its Etiology, Northwest Ethiopia



Amare Teshome, Abebe Muche

Journal of Health Care for the Poor and Underserved, Volume 28, Number 1, February 2017, pp. 216-227 (Article)

Published by Johns Hopkins University Press
DOI: https://doi.org/10.1353/hpu.2017.0018

A Two-Year Retrospective Study on the Pattern of Dental Trauma and its Etiology, Northwest Ethiopia

Amare Teshome, DMD
Abebe Muche, BEd, MSc, PhD

Abstract: **Background**. In Ethiopia traumatic dental injury (TDI) is seriously neglected, regardless of its current increased incidence rate. **Objective**. To determine the etiology and types of TDIs among traumatized patients admitted to Gondar University Hospital Dental Clinic (GUHDC) between September 2013 and August 2015. **Methods**. A retrospective descriptive study design was conducted using previous medical records of 309 patients. Records were retrieved, reviewed and analyzed. **Results**. A total of 309 dental traumatic patients with a mean age of 24.32±5.47 were admitted to the GUHDC. It was found that TDIs were most frequent in males (80.3%), 21–30 age range (47.2%) and rural residents (58.3%). Interpersonal violence (74.1%) and road traffic accidents (23.3%) were the most common etiological factors. The study also revealed that maxillary central incisor was the most frequently affected tooth.

Key words: Traumatic dental injury, interpersonal violence, etiology, pattern of fracture.

Traumatic dental injury (TDI) receives scant attention although it is an ever increasing challenge to health professionals and has serious health implications.[1] Much of the literature on TDI underscores its increased incidence within the last 10–20 years and suggests that it will exceed dental caries and periodontal diseases soon.[2,3] More specifically, maxillofacial and TDI are common occurrences that affect 20-30% of the permanent dentition worldwide, which in turn lead to compromised appearance and function.[4]

Especially if untreated, TDI has a considerable negative impact on children's and adults' quality of life due to associated physical and emotional distress, and may also have a strongly negative influence on social relationships.[5,6] Furthermore, the financial costs arising from such injuries may be considerable.[7]

Dental trauma results from violence, falls, physical aggression, and accidents involving road traffic and sports, among other causes. The extension, intensity, and gravity of dental trauma may affect both the dental tissue itself and its supporting structure.[8]

AMARE TESHOME *is affiliated with the Department of Dentistry, School of Medicine, and the College of Medicine and Health Sciences, at the University of Gondar, Gondar, Ethiopia.* ***ABEBE MUCHE*** *is affiliated with the Department of Human Anatomy, School of Medicine, College of Medicine and Health Sciences, at the University of Gondar, Gondar, Ethiopia. Please address all correspondence to Amare Teshome, Department of Dentistry, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia, P.O.Box 196. Phone: +251910517002. Email: teshomeamare78@yahoo.com.*

A study conducted in Nigeria showed that fall was the most common cause of TDI in both sexes (42.6%). A total of 101 teeth were traumatized, of which 74.3% were maxillary central incisors. Uncomplicated injury (enamel—dentine fracture) was the most common type of injury (57.4%), followed by avulsion (20.8%) and complicated fracture (7.9%). Restoration was the most frequent treatment modality and accounted 66.7% of the cases studied.[9]

A cross-sectional study conducted in Uganda showed that road traffic accident (56.6%) was the leading cause of oral and maxillofacial trauma, followed by interpersonal assault (34.84%). Males within the age range of 21–30 years were the most affected.[10] Additionally, a retrospective study done in Kenyatta National Hospital depicted that males (63.0%) were more affected than females and the leading cause was falling (73.5%) accident. Maxillary central incisors (67.5%) were the most affected teeth with 47.1% of patients having two teeth affected. The majority of the patients sought treatment on the same day as the trauma.[11]

There is scarcity of data and documented information on epidemiology of patterns and etiology of dental trauma in sub-Sahara African countries. To the best of our knowledge, this study is the first of its kind to provide epidemiological data on dental trauma in Ethiopia. The aim of the present study is to investigate the etiology of dental trauma and its pattern among traumatic patients admitted to Dental Clinic of Gondar University Hospital.

Methods

Study area and period. The study was conducted at University of Gondar Referral Hospital which is located in Gondar town, Northwestern Ethiopia from Ocober 2015 to December 2015. Gondar is 739 km from Addis Ababa (the capital city). The University Hospital is one of the biggest tertiary level referral and teaching hospitals containing more than 450 beds for inpatients and rendering referral health services for over five million inhabitants in the region.

Data sources/study populations. All dental traumatic patients who were admitted to the Gondar University Hospital Dental Clinic (GUHDC) between September 2013 and August 2015 were retrospectively reviewed. The patients' records were de-identified (made anonymous) prior to analysis. Medical records of all cases of dental trauma were retrieved. Charts with incomplete information were excluded from the study.

A structured checklist was used to record the patients' demographics including gender, age, residency, etiology of trauma, type of affected tooth, and its site; day and month of trauma; time from trauma to dental visit; and type of treatment modality.

The type of trauma was recorded according to Andreasen's classification as follows:[12]

1. Crown infraction;
2. Uncomplicated crown fracture;
3. Complicated crown fracture;
4. Uncomplicated crown-root fracture;
5. Complicated crown-root fracture;
6. Root fracture;

7. Concussion;
8. Subluxation (loosening);
9. Intrusive luxation;
10. Extrusive luxation;
11. Lateral luxation;
12. Avulsion;
13. Comminution of alveolar socket.

Statistical analysis. The collected data were analyzed using SPSS 20 statistical package software (IBM Co., Armonk, NY, USA). Depending on the variable type, descriptive analysis outputs were given in percentages and numbers.

Results

Sociodemographic characteristics. As shown in Table 1 and 2, within the last two years, 309 patients [248 males (80.3%), 61 females (19.7%)] sustained TDI with a total of 713 teeth representing an injury rate of 2.31 teeth per traumatic incident. The mean age of patients at the time of trauma was 24.32±5.47. The prevalence was high among the age group of 21–30 years (47.2%), males (80.3%) and rural residents (58.3%) (Tables 1 and 2).

Gender, age and residency distribution according to the etiology. As shown in Table 3, the common cause of dental trauma was violence, of which stick or club injury was the most prevalent (28.1%). Motorbike (1.62%), fall (1.29%) and sport (0.65%) accidents were the least frequent contributing factors of dental trauma. Males were more affected than females in violence related dental traumas but females were more affected than males in bajaj (a three-tire vehicle) accidents (68%). Furthermore, the

Table 1.

SOCIODEMOGRAPHIC CHARACTERISTICS OF TRAUMATIC PATIENTS (N = 309) VISITING GUHDC, 2013–2015

Sociodemographic variables	Number	%
Gender		
Male	248	80.3
Female	61	19.7
Age		
<10	0	0
11–20	72	23.3
21–30	146	47.2
>30	91	29.4
Residency		
Urban	129	41.7
Rural	180	58.3

most vulnerable age groups in all etiologic factors except minibus/bus accidents were youth in the age range of 21 and 30 years (see Table 3).

Rural residents were more prone to stick injuries and axe and minibus/bus accidents than urban dwellers but the reverse was evident for fist-punch injuries (Figure 1).

The pattern of dental trauma. Among 309 patients who had sustained TDI, 266 patients had dental hard tissue trauma with 713 teeth injured and were evaluated according to Andreasen's classification as presented in Table 4. From 713 injured teeth,

Table 2.

AGE AND GENDER DISTRIBUTION OF THE INJURED PATIENTS (N = 309) VISITING GUHDC, 2013–2015

	Gender				
	Male		Female		
Age groups	Number	%	Number	%	Total
11–20	63	87.5	9	12.5	72
21–30	110	75.3	36	24.7	146
>30	75	82.4	16	17.6	91

Table 3.

GENDER AND AGE DISTRIBUTION OF PATIENTS RELATED TO ETIOLOGY OF TDI VISITING GUHDC, 2013–2015 (N = 309)

	Gender		Age			
Etiology	Male	Female	11–20	21–30	>30	Total
Interpersonal Violence						
Stick	74	13	12	42	33	87
Boxing /Fist	45	15	20	28	12	60
Axe	11	0	0	8	3	11
Stone	69	2	18	33	20	71
Road traffic Accident						
Motorbike	5	0	2	3	0	5
Bajaj	8	17	5	16	4	25
Minibus/Bus	30	12	12	13	17	42
Sport	2	0	0	2	0	2
Fall	4	2	3	1	2	6
Total	248	61	72	146	91	309

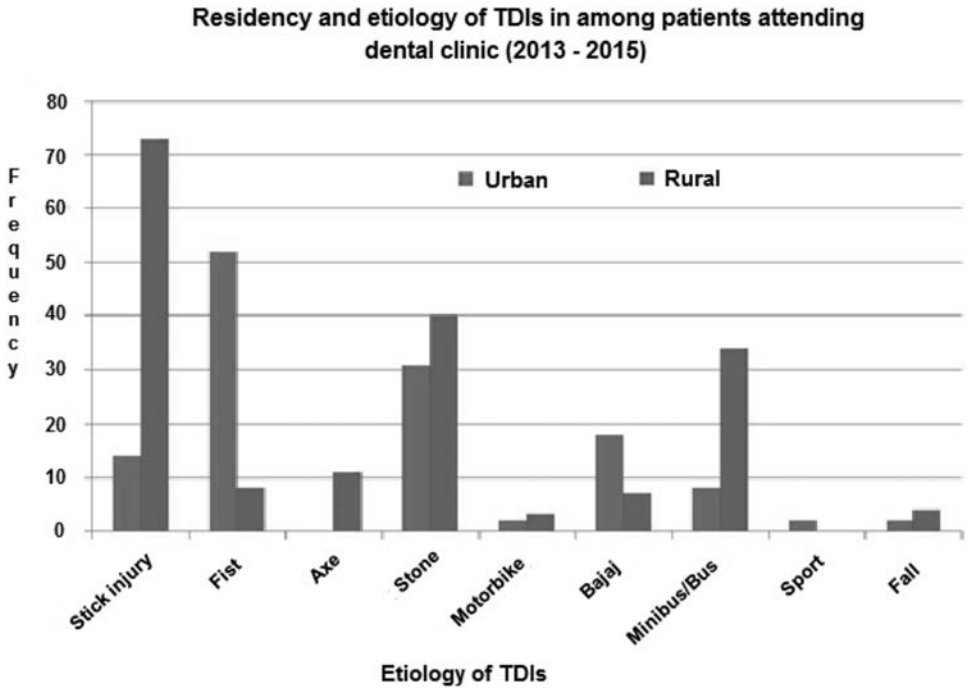


Figure 1. Geographic distribution of patients with TDIs visiting GUHDC (n = 309), 2013–2015.
TDIs = Traumatic dental injury; GUHDC = Gondar University Hospital Dental Clinic

287 (40.3%) were maxillary central incisors, followed by maxillary lateral (133, 18.7%) and mandibular central incisors (113, 15.8%).

According to Andreasen's classification, the majority of the dental injuries were avulsion (26.5%) and 75.1% of the avulsion was from maxillary arch. There was no patient with class-4 (uncomplicated crown-root fracture) (see Table 4). Of all the patients who had dental hard tissue trauma, 29.7% had two injured teeth and 11.7% of patients had five or more teeth injured (see Figure 2). Of those patients (50.81%) who were admitted to dental clinic for treatment within the first 24 hours of injury, only 0.65% of the patients revisited dental clinic after one month (See Figure 3).

Treatment modalities and time of trauma occurrence. As presented in Table 5, restoration and splinting were the most frequent treatment modalities; however, only 2.6% of patients have had re-implantation for their avulsed tooth.

The distribution of dental trauma was high between November and February with a peak level in February (Figure 4). According to daily distribution of the trauma report, more trauma incidence was detected during weekend (Saturday and Sunday; see Figure 5).

Discussion

Traumatic dental injuries are some of the most important emergency cases in dental departments. Fracture of one or more teeth, especially the anterior teeth, may result

Table 4.

DISTRIBUTION OF TRAUMATIZED TEETH ACCORDING TO ANDREASEN'S CLASSIFICATION (N = 309), 2013–2015

Andersen's classification	Maxillary teeth (FDI)				Mandibular teeth (FDI)				Total
	11/21	12/22	13/23	14/24	31/41	32/42	33/43	34/44	
1	12	7	6	0	2	3	0	0	30
2	41	23	16	4	16	3	3	4	110
3	20	16	4	2	2	6	4	0	54
4	0	0	0	0	0	0	0	0	0
5	4	4	0	2	2	1	0	0	13
6	8	2	4	0	0	2	0	2	18
7	4	5	3	3		6	2	0	23
8	24	4	0	0	4	2	3	1	38
9	46	22	2	0	24	13	2	4	113
10	2	0	1	0	2	2	0	0	7
11	20	18	0	0	6	4	2	0	50
12	78	30	25	9	27	8	6	6	189
13	28	2	2	0	28	8	0	0	68
Total	287	133	63	20	113	58	22	17	713

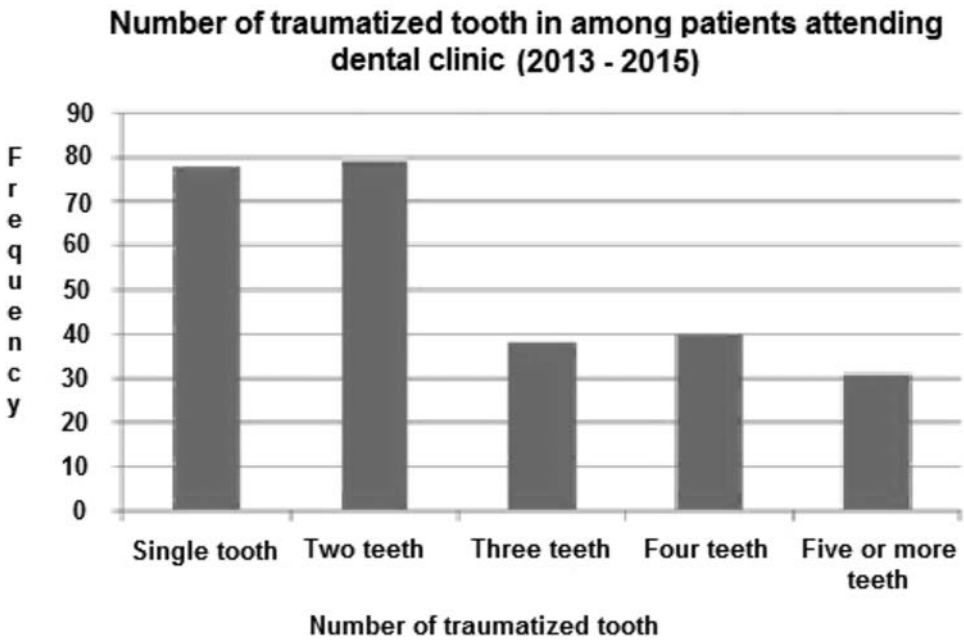


Figure 2. Number of traumatized tooth per patient (n = 266).

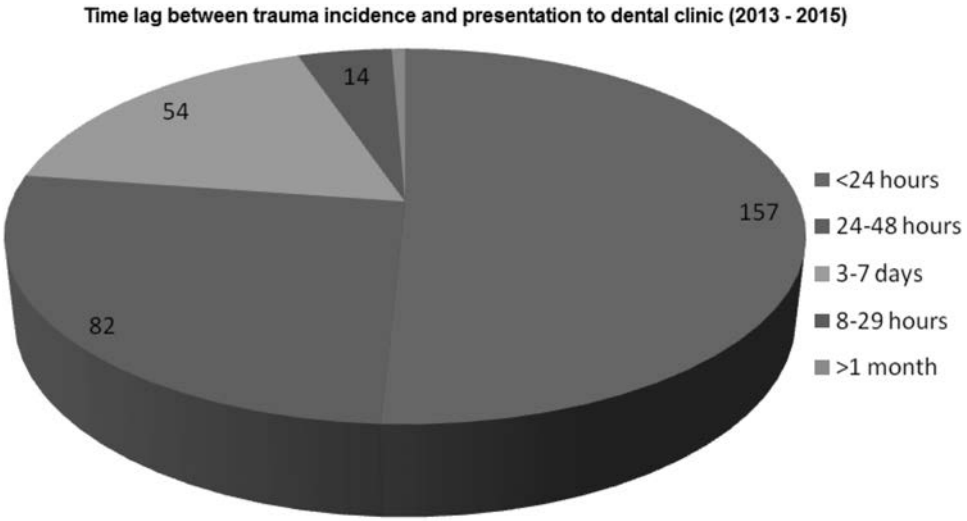


Figure 3. Time lag between trauma and patient presentation to Dental Clinic (n = 309) among patients visiting GUHDC, 2013–2015.
GUHDC = Gondar University Hospital Dental Clinic

Table 5.

TREATMENT MODALITIES FOR THE AFFECTED TEETH (N = 266) AMONG PATIENTS VISITING GUHDC, 2013–2015

Type of treatment	Frequency	Percent
Restoration	89	33.5%
Root canal treatment	23	8.6%
Reimplantation	7	2.6%
Extraction	39	14.7%
Splinting(composite/arch bar)	79	29.7%
No treatment/refusal	29	10.9%

in pain, loss of function, poor aesthetics, and psychological trauma. Such traumatic dental injuries are widespread in the population and considered to be serious dental public health problems among children.[13]

In the present study, the sex distribution of TDI is highly frequent in males and is consistent with studies conducted elsewhere.[10,11,14–18] In our study, the male to female ratio was 4.06:1 which differs from the study conducted in Uganda (7.7:1)[10] and Brazil (8.3:1). Nevertheless, in our study the male to female ratio was higher than the studies conducted in Kenya (1.7:1),[11] Nigeria (1.5:1, 2:1),[9,19] Queensland (1.8:1),[18] another study in Brazil (2.12:1),[15] and India (1.7:1).[20] The general predominance of dental trauma

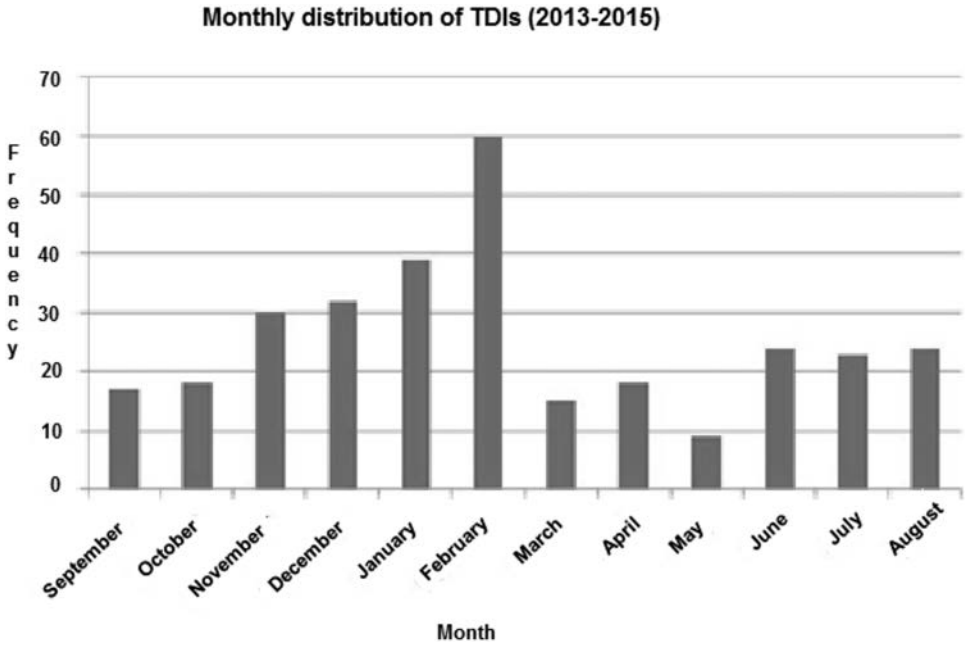


Figure 4. Distribution of dental traumatic patients according to monthly visit (n = 309) among patients visiting GUHDC, 2013–2015.
TDI's = Traumatic dental injury; GUHDC = Gondar University Hospital Dental Clinic

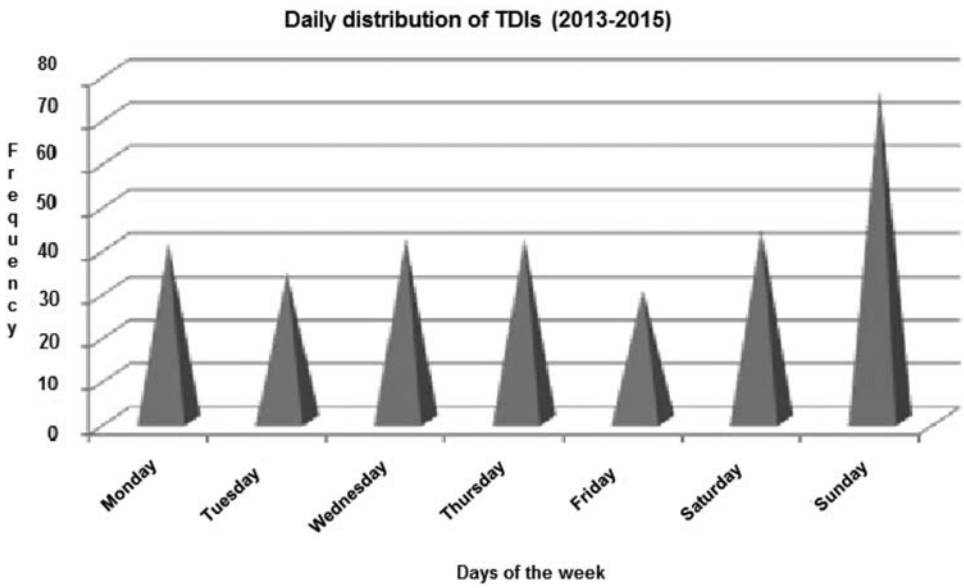


Figure 5. Frequency distribution of dental trauma according to days of the week (n = 309) among patients visiting GUHDC, 2013–2015.
TDI's = Traumatic dental injury; GUHDC = Gondar University Hospital Dental Clinic

injury occurring among men may be attributed to the fact that men tend to be more often involved in aggressive and conflict-ridden situations than women.[19]

Our study demonstrated that TDI was more common in the third decade, age groups of 21–30. In this respect it agrees with studies conducted in Brazil[16] and Nigeria.[19] This may reflect the fact that this age group may be more energetic and aggressive than other age groups.

Moreover, the majority of dental trauma occurs in rural dwellers, and in this respect it is unlike what has been found elsewhere.[15] Our findings strongly suggest that majority of population residing in rural areas in Ethiopia are frequently exposed to overwhelming violence and exposed to primary cause of trauma.

The present study revealed that interpersonal violence (74.1%) was the common cause of dental trauma in Ethiopia; in this respect, it is in contrast with studies done in Uganda (RTA),[10] Nigeria (fall),[9,19] Kenya (fall),[11] and Spain (fall).[21] This may be associated with the fact that the majority of the study participants were adults and lived in rural area.

The maxillary central incisor was found to be the most commonly affected tooth (40.3%) which is in keeping with what has been found in other places: Kenya (67.5%),[11] Nigeria (74.3%),[9] Iran (66.5%),[22] India (75.6%),[20] and Spain (72.4%).[21] This is due to its prominent and vulnerable structure on the face which makes it more prone to fracture than mandibular tooth.[23]

The current study showed that there was a mean of 2.31 injured teeth per patient. This is lower than the finding by Muhammad Ruslin (3.55 injured teeth/patient).[24] A majority of the study participants had more than one tooth affected by the trauma, in keeping with the study conducted by Aguiree Guedes in Brazil (81.75%)[14] and with the study conducted by Sheikh-Nezam in Iran.[22]

A majority of traumatic dental injuries were seen on the weekend (Saturday or Sunday), which is similar with other studies.[16,25,26] This may reflect planned refreshment time and higher ingestion of alcohol during weekend days following five continuous working days. It should be noted that no difference in the daily distribution of trauma was detected in the study conducted in Queensland.[18]

In the present study, there is more exposure to dental trauma between November and February, with a peak level on February. However, seasonal difference in the occurrence of dental trauma was not detected in Iran.[22] Alberta Health Services Regional Trauma Report also demonstrated July as the most traumatic month.[26] The exposure to dental trauma may be directly associated with the festivity and religious/historical holidays in the country.

In this study, avulsion was the most prevalent dental trauma. Another recent study reported higher incidence of avulsion (8.5%) in Brazil.[15] On the other hand, in Iraq the most prevalent dental trauma is enamel fracture (48.5%). The majority of avulsion occurred in males as result of blow on jaw during violence and aggressive activities.[17]

A majority of the patients (50.8%) visited University of Gondar Dental Clinic with in the first 24 hours of trauma exposure. A study conducted in India, in contrast, found that patients reported to dentist a year or after a year of trauma exposure.[27] Clinically, early treatment has a positive impact on the prognosis of trauma.

One-third (33.5%) of the traumatic patients studied here had restoration, which corresponds with the study done in Nigeria (66.7%)[9] and Valencia, Spain (43.2%).[21]

All the avulsed teeth were not replaced. This is due to its prohibitive cost in privately owned health service centers and lack of service in governmental hospitals.

Limitations. During the present study time we have faced the following limitations: first some of patient records were incomplete, making our sample size relatively small. The second limitation was that some of the patients' records did not show patients treatment outcome. Based on this finding, the future researchers should do a prospective study on the clinical outcomes and its impact on the survival rate of the traumatic patients.

Conclusion. The present study gives a baseline data on the pattern and etiology of dental trauma in northwestern Ethiopia. The incidence of TDI was mainly related with gender, age, and residency, and is commonly occurred in maxillary central incisor tooth. Interpersonal violence and road traffic accidents were frontline etiological factors. The incidence of TDI was high during weekends, and in January and February.

Recommendations. The majority of TDI were occurred during the weekend and this observation should influence planning. Additionally, the Ethiopian Ministry of health should have dental emergency unit to give immediate treatment for the traumatic patients and avoid the long-term complications of the trauma.

Conflict of interest

The authors declare no competing interest. No external funding.

Authors' Contributions

AT: conception of research idea, study design, conducts research, data collection, analysis and interpretation, and draft the manuscript. **AM:** data analysis and interpretation, and reviewed the manuscript.

Ethical approval

The study was approved by the ethical review board of University of Gondar.

References

1. Marcenes W, Murray S. Social deprivation and traumatic dental injuries among 14-year-old schoolchildren in Newham, London. Dent Traumatol. 2001 Feb;17(1):17–21.
https://doi.org/10.1034/j.1600-9657.2001.170104.x
PMid:11475766
2. Tapias MA, Jimenez-Gracia R, Lamas F, et al. Prevalence of traumatic crown fractures to permanent incisors in a childhood population: Móstoles, Spain. Dent Traumatol. 2003 Jun;19(3):119–22.
https://doi.org/10.1034/j.1600-9657.2003.00141.x
PMid:12752531
3. Andreason JO, Andreasen FM. Textbook and color atlas of traumatic injuries to the teeth (3rd ed.). Copenhagen, Denmark: Munksgaard, 1993.
PMid:8360281
4. Bourguignon C, Sigurdsson A. Preventive strategies for traumatic dental injuries. Dent Clin North Am. 2009 Oct;53(4):729–49.
https://doi.org/10.1016/j.cden.2009.06.002
PMid:19958909

5. Marcenes W, Al Beiruti N, Tayfour D, et al. Epidemology of traumatic injuries to the permanent incisors of 9–12 years-old school children in Damascus, Syria. Endod Dent Traumatol. 1999 Jun;15(3):117–23.
https://doi.org/10.1111/j.1600-9657.1999.tb00767.x
PMid:10530154
6. Cortes MI, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12–14-year-old children. Community Dent Oral Epidemiol. 2002 Jun;30(3):193–8.
https://doi.org/10.1034/j.1600-0528.2002.300305.x
PMid:12000342
7. Zuhal K, Semra OE, Hüseyin K. Traumatic injuries of the permanent incisors in children in southern Turkey: a retrospective study. Dent Traumatol. 2005 Feb;21(1):20–5.
https://doi.org/10.1111/j.1600-9657.2004.00265.x
PMid:15660751
8. Punitha VC, Amudhan A, Sivaprakasam P, et al. Role of dietary habits and diet in caries occurrence and severity among urban adolescent school children. J Pharm Bioallied Sci. 2015 Apr;7(Suppl 1):S296–300.
https://doi.org/10.4103/0975-7406.155963
PMid:26015737 PMCid:PMC4439697
9. Adekoya-Sofowora C, Bruimah R, Ogunbodede E. Traumatic dental injuries experience in suburban Nigerian adolescents. Internet J Dental Sci. 2004;3(1):1–6.
10. Kamulegeya A, Lakor F, Kabenge K. Oral maxillofacial fractures seen at a Ugandan tertiary hospital: a six-month prospective study. Clinics (Sao Paulo) 2009;64(9): 843–8.
https://doi.org/10.1590/S1807-59322009000900004
PMid:19759877 PMCid:PMC2745137
11. Muriithi HM, Masiga MA, Chindia ML. Dental injuries in 0–15 year olds at the Kenyatta National Hospital, Nairobi. East Afr Med J. 2005 Nov;82(11):592–7.
PMid:16463754
12. Andreasen JO, Andreasen FM. Dental traumatology: quo vadis. Dent Traumatol. 1990 Apr; 6(2):78–80.
https://doi.org/10.1111/j.1600-9657.1990.tb00395.x
13. Borssen E, Holm AK. Traumatic dental injuries in a cohort of 16-year-olds in northern Sweden. Endod Dent Traumatol. 1997 Dec;13(6):276–80.
https://doi.org/10.1111/j.1600-9657.1997.tb00055.x
PMid:9558509
14. Guedes OA, de Alencar AH, Lopes LG, et al. A retrospective study of traumatic dental injuries in a Brazilian dental urgency service. Braz Dent J. 2010;21(2):153–7.
https://doi.org/10.1590/S0103-64402010000200011
PMid:20640363
15. Batista AM, Marques LS, Batista AE, et al. Urban-rural differences in oral and maxillofacial trauma. Braz Oral Res. 2012 Mar-Apr;26(2):132–8.
https://doi.org/10.1590/S1806-83242012000200008
PMid:22473348
16. Cavalcantia AL, Bezerra PKM, de Oliveira DM, Granville- Garcia AF. Maxillofacial injuries and dental trauma in patients aged 19–80 years, Recife, Brazil. Revista Espaola de Cirugía Oral y Maxilofacial. 2010 Jan-Mar;32(1):11–6.
https://doi.org/10.1016/S1130-0558(10)70026-5

17. Farhan HF, Mohammed AT. Traumatized anterior teeth among 13–15 years old intermediate school students in Hilla City, Babylon governorate-IRAQ. Iraq Dent J. 2014; 36(1):14–9.
18. Wood EB, Freer TJ. A survey of dental and oral trauma in south-east Queensland during 1998. Aust Dent J. 2002 Jun;47(2):142–6.
https://doi.org/10.1111/j.1834-7819.2002.tb00318.x
PMid:12139268
19. Ajayi DM, Abiodun-Solanke IM, Sulaiman AO, et al. A retrospective study of traumatic injuries to teeth at a Nigerian tertiary hospital. Niger J Clin Pract. 2012 Jul–Sep;15(3):320–5.
https://doi.org/10.4103/1119-3077.100631
PMid:22960969
20. Batra M, Kandwal A, Gupta M, et al. Prevalence of dental traumatic injuries to permanent incisors in Indian children: a cross-sectional survey. J Dent Sci Oral Rehab. 2014;5(1):1–4.
21. Faus-Damiá M, Alegre-Domingo T, Faus-Matoses I, et al. Traumatic dental injuries among school children in Valencia, Spain. Med Oral Patol Oral Cir Bucal. 2011 Mar 1;16(2):e292–5.
https://doi.org/10.4317/medoral.16.e292
PMid:20711120
22. Sheikh-Nezami M, Akbari M, Shamsian K, et al. Retrospective study of traumatic dental injuries in north-east of Iran. Journal of Dental Materials and Techniques. 2014;4(1):37–42.
23. Canakci V, Akgül HM, Akgül N, et al. Prevalence and handedness correlates of traumatic injuries to the permanent incisors in 13–17-year-old adolescents in Erzurum, Turkey. Dent Traumatol. 2003 Oct;19(5):248–54.
https://doi.org/10.1034/j.1600-9657.2003.00199.x
PMid:14708648
24. Ruslin M, Wolff J, Boffano P, et al. Dental trauma in association with maxillofacial fractures: an epidemiological study. Dent Traumatol. 2015 Aug;31(4):318–23. Epub 2015 Apr 19.
https://doi.org/10.1111/edt.12176
PMid:25892049
25. Petersson EE, Andersson L, Sörensen S. Traumatic oral vs. non-oral injuries. Swed Dent J. 1997;21(1–2):55–68.
PMid:9178450
26. Calgary Health Region. Regional Trauma Services: Annual Report April 1, 2006–March 31, 2007. Edmonton, Alberta: Calgary Health Region, 2007. Available at: http://www.albertahealthservices.ca/assets/info/hp/trauma/if-hp-trauma-calzone-ann-rpt-gen-07.pdf.
27. Amit V, Ravi KS, Roshan NM, et al. Analysis of reporting pattern in children aged 7 to 14 years with traumatic injuries to permanent teeth. Int J Clin Pediatr Dent. 2010 Jan-Apr;3(1):15–9. Epub 2010 Apr 15.